

World Energy Projection System

The projections of world energy consumption published annually by the Energy Information Administration (EIA) in the *International Energy Outlook (IEO)* are derived from the World Energy Projection System (WEPS). WEPS is an integrated set of personal-computer-based spreadsheets containing data compilations, assumption specifications, descriptive analysis procedures, and projection models. The WEPS accounting framework incorporates projections from independently documented models and assumptions about the future energy intensity of economic activity (ratios of total energy consumption divided by gross domestic product [GDP]) and about the rate of incremental energy requirements met by natural gas, coal, and renewable energy sources (hydroelectricity, geothermal, solar, wind, biomass, and other renewable sources).

WEPS provides projections of total world primary energy consumption, as well as projections of energy consumption by primary energy type (oil, natural gas, coal, nuclear, and hydroelectric and other renewable resources), and projections of net electricity consumption and energy use in the transportation sector. Projections of energy consumed by fuel type are also provided for electricity generation and for transportation. Carbon emissions resulting from fossil fuel use are derived from the energy consumption projections. All projections are computed in 5-year intervals through the year 2020. For both historical series and projection series, WEPS provides analytical computations of energy intensity and energy elasticity (the percentage change in energy consumption per percentage change in GDP).

WEPS projections are provided for regions and selected countries. Projections are made for 14 individual countries, 9 of which—United States, Canada, Mexico, Japan, United Kingdom, France, Germany, Italy, and Netherlands—are part of the designation “industrialized countries.” Individual country projections are also made for China, India, South Korea, Turkey, and Brazil, all of which are considered “developing countries.” Beyond these individual countries, the rest of the world is divided into regions. Industrialized regions include North America (Canada, Mexico, and the United States), Western Europe (United Kingdom, France, Germany, Italy, Netherlands, and Other Europe), and Pacific (Japan and Australasia, which consists of Australia, New Zealand, and the U.S. Territories). Developing regions include developing Asia (China, India, South Korea, and Other Asia), Middle East (Turkey and Other

Middle East), Africa, and Central and South America (Brazil and Other Central and South America). The transitional economies, consisting of the countries in Eastern Europe (EE) and the former Soviet Union (FSU), are considered as a separate country grouping, neither industrialized nor developing. Within the EE/FSU, projections are made separately for nations designated as Annex I and non-Annex I in the Kyoto Climate Change Protocol.

The process of creating the projections begins with the calculation of a reference case total energy consumption projection for each country or region for each 5-year interval in the forecast period. The total energy consumption projection for each forecast year is the product of an assumed GDP growth rate, an assumed energy elasticity, and the total energy consumption for the prior forecast year. For the first year of the forecast, the prior year consumption is based on historical data. Subsequent calculations are based on the energy consumption projections for the preceding years.

Projections of world oil supply are provided to WEPS from EIA’s International Energy Module, which is a submodule of the National Energy Modeling System (NEMS). Projections of world nuclear energy consumption are derived from nuclear power electricity generation projections from EIA’s International Nuclear Model (INM), PC Version (PC-INM). All U.S. projections are taken from EIA’s *Annual Energy Outlook (AEO)*.

A full description of WEPS is provided in a model documentation report: Energy Information Administration, *World Energy Projection System Model Documentation*, DOE/EIA-M050(97) (Washington, DC, September 1997). The report presents a description of each of the spreadsheets associated with WEPS, along with descriptions of the methodologies and assumptions used to produce the projections. The entire publication can be found through the Internet in portable document format (PDF) at: <ftp://ftp.eia.doe.gov/pub/pdf/model.docs/m05097.pdf>.

The WEPS model will be made available for downloading through the Internet on EIA’s home page by May 2000. The package will allow users to replicate the projections that appear in *IEO2000*. It is coded in Excel, version 5.0, and can be executed on any IBM-compatible personal computer in a Windows environment. The package requires about 8 megabytes of hard disk space for complete installation and model execution.